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**COMPLICATIONS OF RECONSTRUCTION PLATE INSTALLATION
 IN MANDIBULAR
 (CASE REPORT)**

Leni Ruslaini¹⁾, Asri Arumsari²⁾, Abel Tasman³⁾, Kiki Akhmad Rizki⁴⁾

¹⁾ Resident of Oral and Maxillofacial Surgery, Faculty of Dentistry, Universitas Padjadjaran.

²⁾ Department of Oral and Maxillofacial Surgery, RSUP Dr. Hasan Sadikin Bandung, Indonesia

³⁾ Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Universitas Padjadjaran and RSUP Dr. Hasan Sadikin Bandung, Indonesia

⁴⁾ Staff of Onkology Department, RSUP Dr. Hasan Sadikin, Faculty of Medicine, Universitas Padjadjaran and RSUP Dr. Hasan Sadikin Bandung, Indonesia

ABSTRACT

Background: Mandibular resection will cause mandibular stability disturbance due to loss of some part of the bone. Instability of the mandible can cause aesthetic, physiological, and psychological malfunction. Installment of mandibular reconstruction plat on the remaining mandibular using screws were suggested to restore its stability. However, it is not uncommon that plat exposure occurs following mandibular reconstruction, caused by inaccurate adaptation of the plats to the mandibular bone. The aims of this report are to describe the various complications and managements after jaw resection and reconstruction with plates. **Case Report:** A 44 years old male patient complained the small defect in the chin, painless, and no fluid emitted, accompanied by dermatitis. Intra oral examination showed no abnormalities. About 1 year ago the patient performed segmental resection of the mandible on the indication of ameloblastoma. The radiological x-ray showed all screw detached from the plat and radiolucent images appeared around the plat that attached to the mandible. The diagnosis was fistula at regio mentale, post resection and reconstruction surgery, suspected caused by titanium plate allergies. The provided therapies were fistulectomy, screw removal, and plate reconstruction. Post therapy conditions showed improvement and no patients complaints of pain. **Conclusion:** Plate exposure is a complication that can occur after the installation of the reconstruction plate, but besides that it can also cause an allergic reaction from the material used.

Keywords: Complication, Mandibular Resection, Plate Reconstruction, Titanium Plate Allergies,.

Correspondence: Leni Ruslaini, Faculty of Dentistry, Universitas Padjadjaran, Sekeloa street I No.10 Bandung Indonesia. Email : leni17003@mail.unpad.ac.id

INTRODUCTION

Congenital and acquired diseases, including inflammation and developmental disorders, are the etiology for mandibular defect or discontinuity, however the main cause is tumor resection.¹ Commonly, mandibular resection technique comprised of marginal resection, segmental resection, total resection and composite resection.³ A study conducted by Outpatient Installation of Oral and Maxillofacial Surgery, dr. Hasan Sadikin Hospital Bandung in 2018 reported that the number of patients experiencing mandibular resection and reconstruction from 2016 - 2018 was 72 patients including 25 males and 47 females ranging from 13 - 74 years old. This study reveals that 14 patients (19.44%) were suffered from plate reconstruction application of exposed plate², that constrains reconstructive action.

Mandibular reconstruction was first performed with free autologous bone transplantation method by Lexer using tibial bone

on 1907 and sternal bone on 1908. Various reconstruction technique has been developed by considering the importance of functional integration from free bone graft transplanted with local bone structure to enhance the success. Factors affecting initial remodeling of transplanted bone includes physiological pressure, quality of transplanted bone, stability of bone fixation, and condition of surrounding soft tissue are required for the success of transplantation.^{4,5}

Most mandibular reconstructive surgical procedure employs autogenous bone graft. The utilization of xanogeneic bone and allogeneic bone had also been performed effectively. Prosthetic device, pedicled bone flaps, and free vascularized bone-containing flaps had also been applied but each material possesses distinct indication, limitation and complication. Difference between each graft material may be observed in its potential to induce host-graft immunologic response. A number of material types had also been applied to

restore mandibular continuity such as alloplastic and metallic reconstruction bars. Other function of such device in mandibular reconstruction is to maintain mandibular arch in good position between proximal and distal from reconstructed mandibular.⁶⁻⁸

There are several metallic materials such as stainless steel, valium, titanium and other metals.⁶⁻⁸ The benefits of using titanium-based reconstructive plat is it is able to stabilize load or pressure on the jaw.⁹ Several disadvantageous may be observed on palpability, visibility, temperature sensitivity, limitation of mandibular growth, thus it is not advised for patient in growth period. Titanium possesses biocompatible property and it is the standard of choice in maxillofacial. However, this metal may induce corrosion involving electrochemistry that may induce hypersensitivity reaction to the tissue.¹⁰

In this review, authors present one case report of allergic complication following titanium reconstructive plat application post mandibular resection. Short elaboration will be provided on complications that may occur post jaw and facial reconstructive plate application as well as initial sign of titanium plate allergic reaction

CASE REPORT

A 44-year-old male patient arrived with a complain of small cavity on chin region, slightly erythematous compared to surrounding tissue and mild pain as well as itchy yet no pus or other liquid was observed. Approximately on the previous year, patient received segmental resection of mandible in which the condition was diagnosed as ameloblastoma.

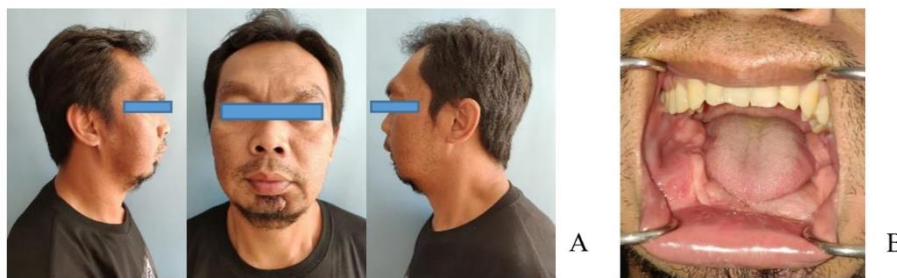


Figure 1. Clinical photograph (A) Extra oral; (B) Intra oral

Extraoral examination revealed facial symmetry with small fistle 1x1x0.5 in size near mentale, ill-defined, slightly erythematous compared to surrounding tissue, and absence of purulent or other liquid (Figure 1.A). Intraoral

examination presented absence of abnormality and colour changes overall mucosa, absence of tenderness, absence of swelling and pus on the vestibule (Figure 1.B).



Figure 2. Panoramic radiograph presents radioluscent on anterior border of lower jaw, there is the presence of plate and screw.

Radiologic examination demonstrated the presence of detached screws from plate and radiolucent appearance surrounding the plate that was attached to the mandible. Radiolucent

appearance was observed encircling the plate located on mandible bone (Figure 2).

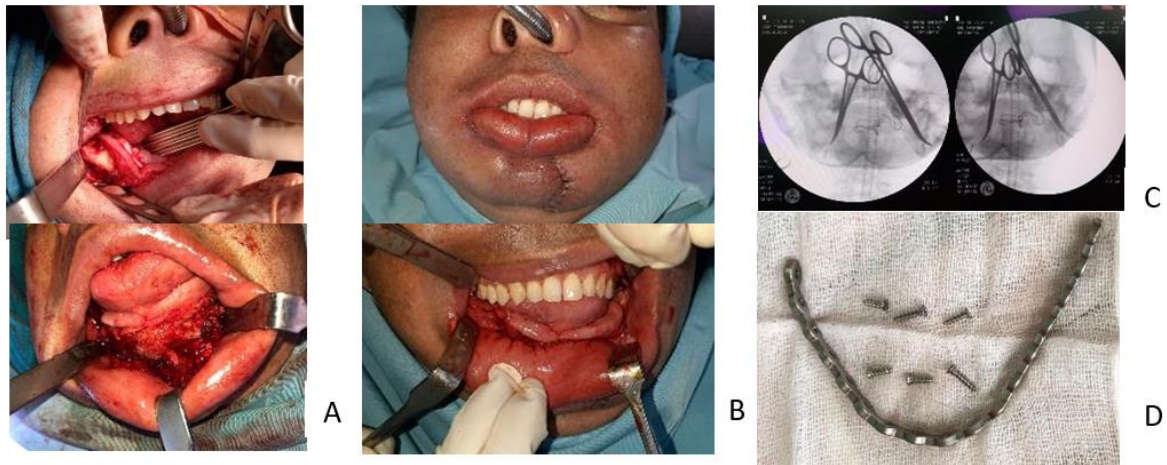


Figure 3. (A) Durante op - plate and screw was removed, (B) Durante op - surgical area was covered and sutured, (C) Imaging picture of C-arm instrument, (D) Plate and screw had been removed from the jaws, imaging result of CPR instrument.

Surgical approach was performed in general necrose to remove screws and plate as well as the removal of fistle in midline region (Figure 3). During surgical treatment, there was complexity to

take the screws from the jaw that C-arm was used to locate the presence of detached screw of the plate (Figure 3.C).



Figure 5. Clinical photograph 4 months after the removal of plate and screw; (A) Extraoral; (B) Intraoral



Figure 6. Panoramic radiograph 4 months after the removal of plate and screws.

Patient's condition 4 months after the removal of plate and screws presented with no fistula while intraoral examination resulted in no fistula or other clinical abnormalities. Neither pain nor dermatitis was recorded in the examination (Figure 5). Panoramic radiography shows radiolucent appearance near previously located plate (Figure 6).

DISCUSSION

In this case report, it was reported radiographically that titanium plate was able to restore mandibular unity by applying straight titanium plate in 17 hole non locking system on the mandible with three left screws in left mandible and three screws on right mandible. All screws were detached from plate after one year application and followed by a complaint of erythematous on the chin or dermatitis. Radiographic examination presented the image of detached screws from plate and radiolucent appearance surrounding the plate that remains attached on the mandible (Figure 2). This condition may be associated with the etiology of being allergic to titanium material.

Defect continuity will result in the strain of masticatory muscles that are attached of mandibular fragment. This should be considered when stabilizing the remaining mandible into normal position as partial resection was performed. Defect continuity will result in the strain of masticatory muscles that are attached of mandibular fragment. This should be considered when stabilizing the remaining mandible into normal position as partial resection was performed. The metal plate attached to the mandible during resection is very useful in controlling the placement of the mandibular fragment. The plate can be placed in the normal arch when the mandible is reconstructed with a bone graft. When the position of the remaining mandibular fragment cannot be maintained during resection, realignment will be more difficult during mandibular reconstruction.^{6,11}

Inappropriate adaptation of the curved titanium plate can cause plate exposure complications. The use of a three-dimensional stereolithography model is very helpful for the success of mandibular reconstruction because it is able to provide an idea of how to properly place the plate.¹² Bone immobilization is needed to speed up the bone healing process. The reconstruction plate must be secured to retain the mandibular fragments, and these fragments must be immobilized rigidly so that there is no movement between them. This immobilization is often performed using intermaxillary fixation. Other methods of immobilization are common, such as the use of bone plates between the remaining bone fragments. Immobilization for 8-12 weeks is usually required

for adequate healing between the plate and the remaining mandibular fragment.^{13,14}

The criteria for the success of mandibular reconstruction are not only based on the restoration of bone continuity, but there are several main targets that must be achieved, namely a mandibular morphology that is close to normal, a harmonious relationship with the maxilla, adequate bone height and width, good facial contours, and supports the soft tissue structure that covers it as well as the restoration of jaw function. However, until now complications related to the use of postoperative plates such as plate exposure, plate fracture, screw loss and infection sometimes still occur.⁴

Complications of plate reconstruction that occur can be caused by many factors, namely age, systemic disease, oral malignancy, tissue tension during closure, thin soft tissue covering, postoperative radiotherapy and chemotherapy, extensive resection, tissue necrosis around the plate and allergies.¹⁵⁻¹⁷ Allergic conditions can occur in the form of an immune reaction to metal particles released from the corrosion of metal. The formation of a humoral response is characterized by the formation of antibodies and immune complexes. TH1 lymphocytes will release proinflammatory cytokines that will bring macrophages to the implant site/plate.¹⁸

In this case, the color of the chin area is reddish, and radiological images show that the screws and titanium plates are detached from the mandibular bone tissue. Bircher et al. reported five patients who developed complications after knee or shoulder joint replacement, who later discovered a contact allergy to benzoyl peroxide. Reactions experienced by the patient include pain, swelling, pruritis, and loosening of the implant.¹⁹ In dentistry, titanium has been widely used because of its high biocompatibility, but many allergic reactions to titanium have also been reported despite negative results on sensitivity tests.^{18,20} Hypersensitivity can be immediate within minutes, humoral response (type I, II, III reactions) within hours to days. Implant-associated hypersensitivity reactions are generally of the latter type (type IV) i.e. delayed hypersensitivity which can manifest as a failure to adapt the plate to the tissue and various adverse reactions including chronic inflammation.^{10,21} If a hypersensitivity reaction occurs, the titanium is removed with or without the use of metal and recovery can take up to six to nine months.²⁰ It can be concluded that plate exposure is a complication that can occur after the installation of the reconstruction plate, but besides that it can also cause an allergic reaction from the material used. Adaptation of reconstructive plate on mandible is not always received well by human body, therefore in such case it can be decided type of plate material should be able to adapt well such as resorbable plate or autogenous bone graft.

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Conflict Of Interest

No potential conflict of interest was reported by the authors.

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